

# DTC Verification for the HMT

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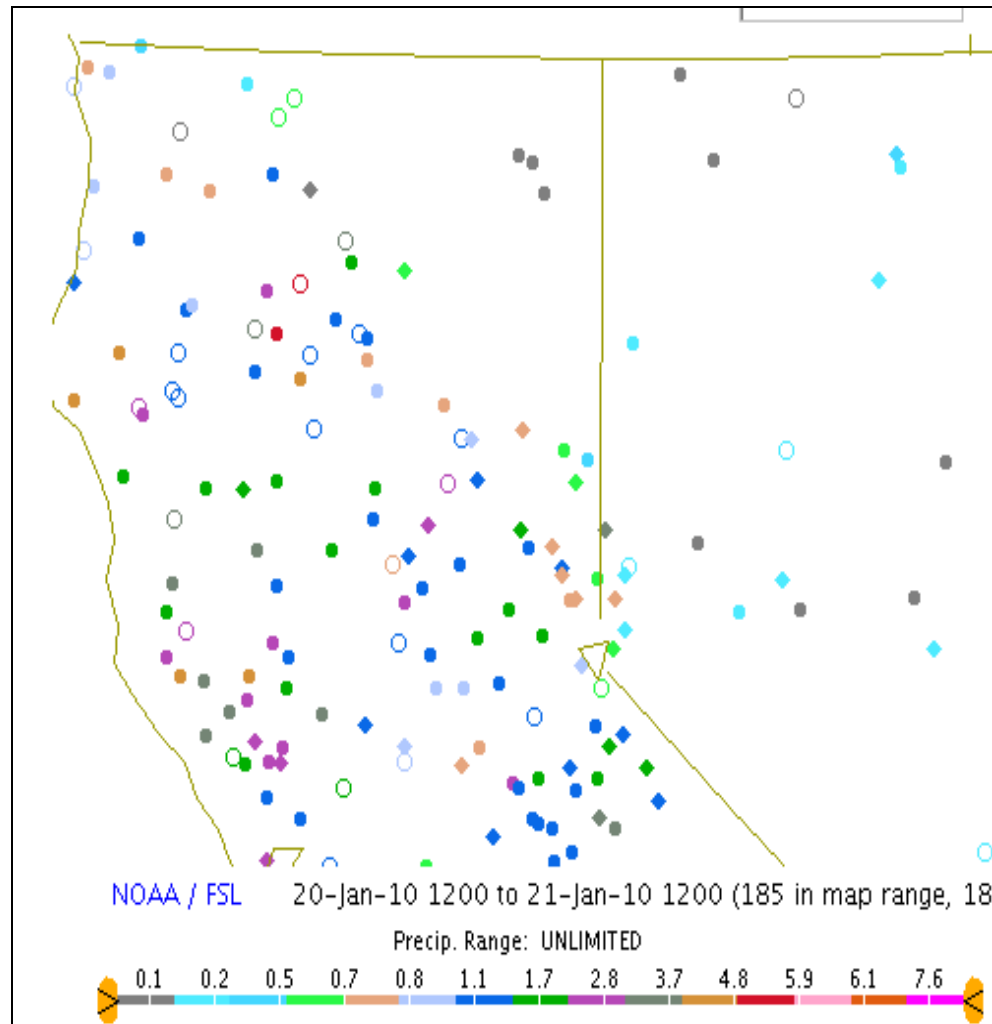
*Acknowledgments to the USWRP for funding*

# HMT Science Objectives and DTC Assessment Response

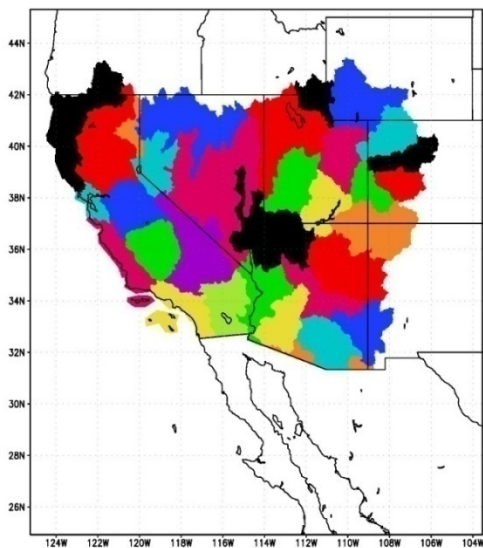
- 1) Assessment of forecast value of high-resolution WRF ensemble system for QPF during extreme rainfall events
  - Response, 2009-10: Comprehensive quasi-real-time and retrospective MET-based verification website including GFS
  - Retrospective analyses to demonstrate forecast utility and scoring 'quirks' (i.e., lessons learned) during heavy rain
  - Application to microphysics sensitivity assessment? ICs?
- 2) Application of state-of-the-art verification techniques to forecasts of atmospheric rivers (AR) and high-precipitation events
  - MODE-based object evaluation with IWV objects: case studies and moisture flux extension
  - Comparison of ensemble members precipitation features
- 3) Estimates of the impact of different observing systems
  - For QPF, Gauges vis-à-vis analyses (eg., Stage IV)
  - Example of diagnostic application of Vx results

# Precipitation during 1200 UTC 20 January – 21 January 2010

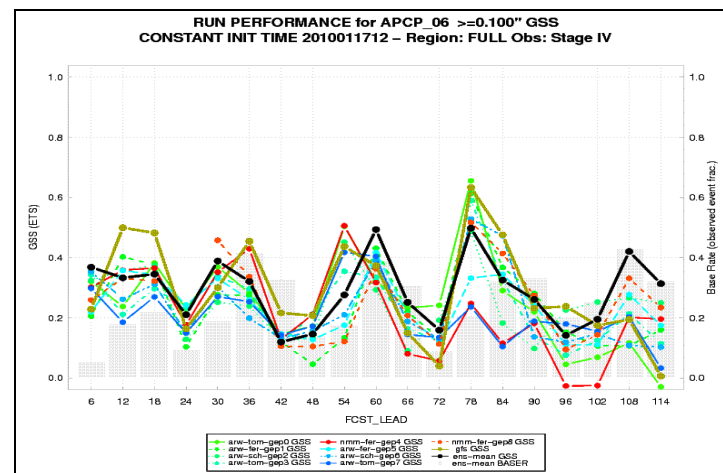
*(Just another day for precipitation in N. California Mtns???????)*



# FY 2010 HMT-West: Demonstration Website

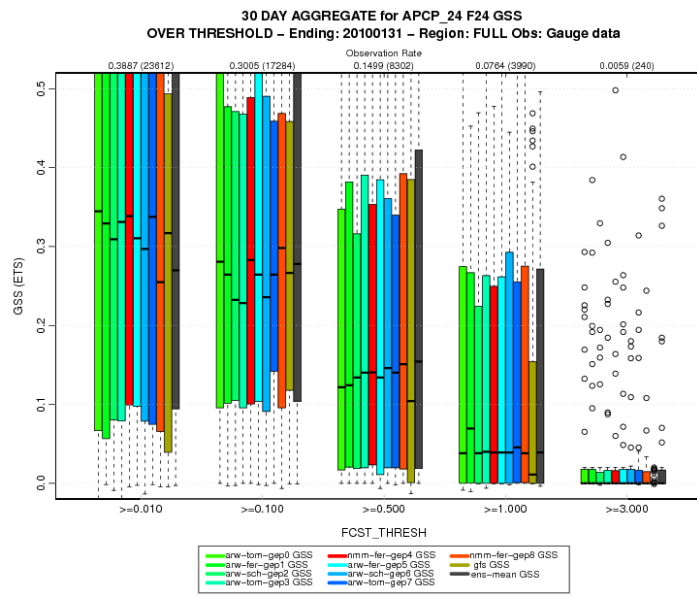


Assessment of ensemble member QPF possible in near real time.

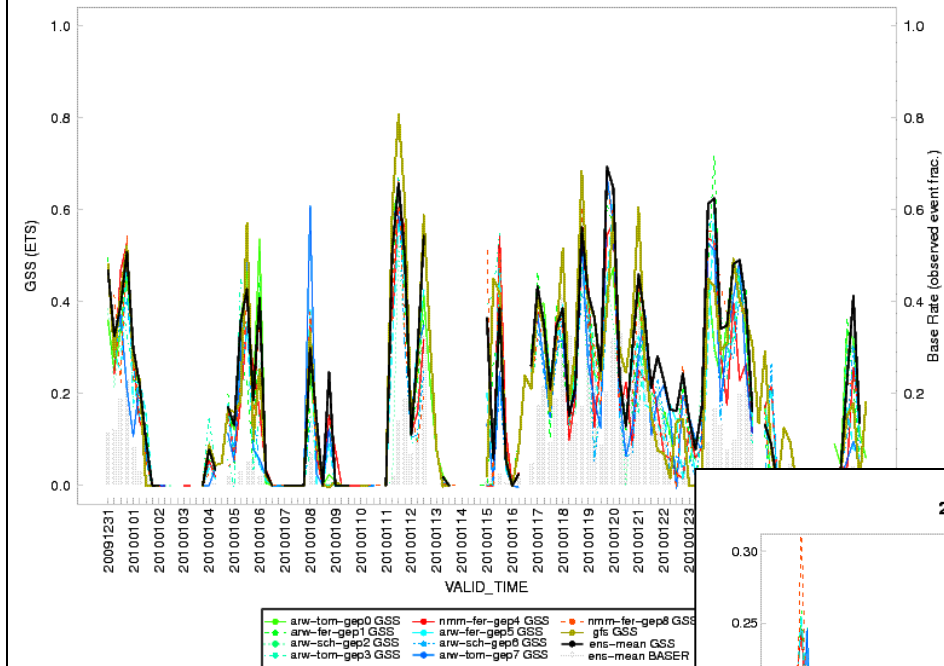


Basin-specific and REC-specific verification domains installed

30-day boxplots provide statistical summary of model QPF performance



**DAILY PERFORMANCE for APCP\_06  $\geq 0.100$ " GSS**  
**CONSTANT FCST\_LEAD - Ending: 20100131 - Region: FULL - Obs: Stage IV data**



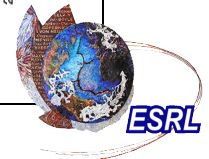
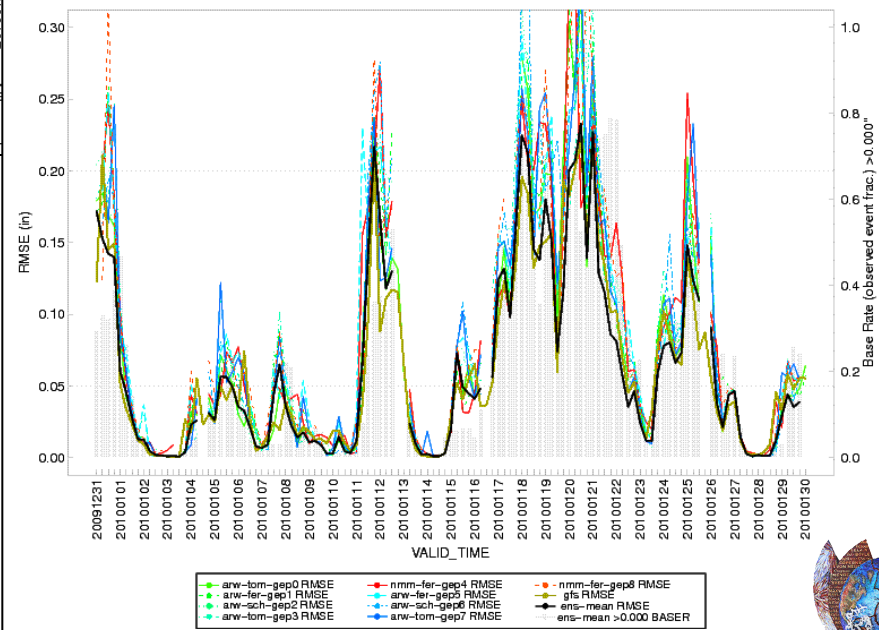
## ETS for January

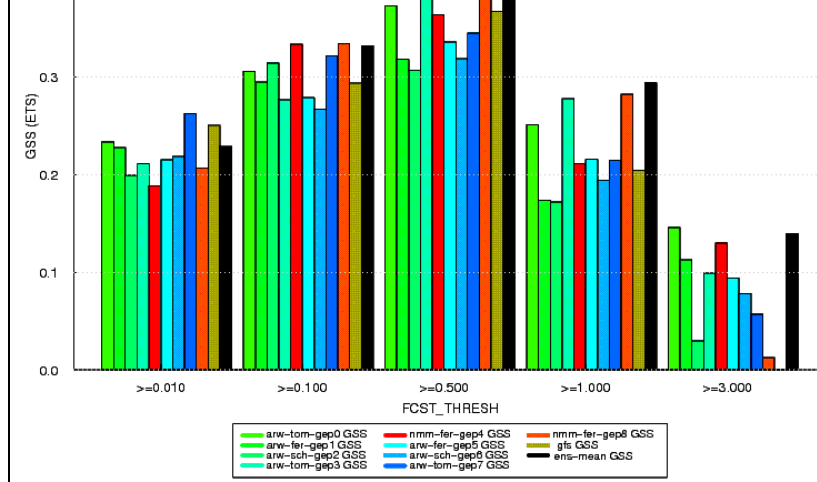
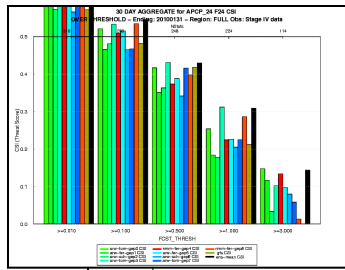
Large day-to-day variability  
 related to rainfall amount;  
 extensive rain means  
 better scores

## RMSE for January

Large rainfall means  
 larger errors

**DAILY PERFORMANCE for APCP\_06 RMSE**  
**24hr FCST - Region: FULL - Obs: Stage IV data**

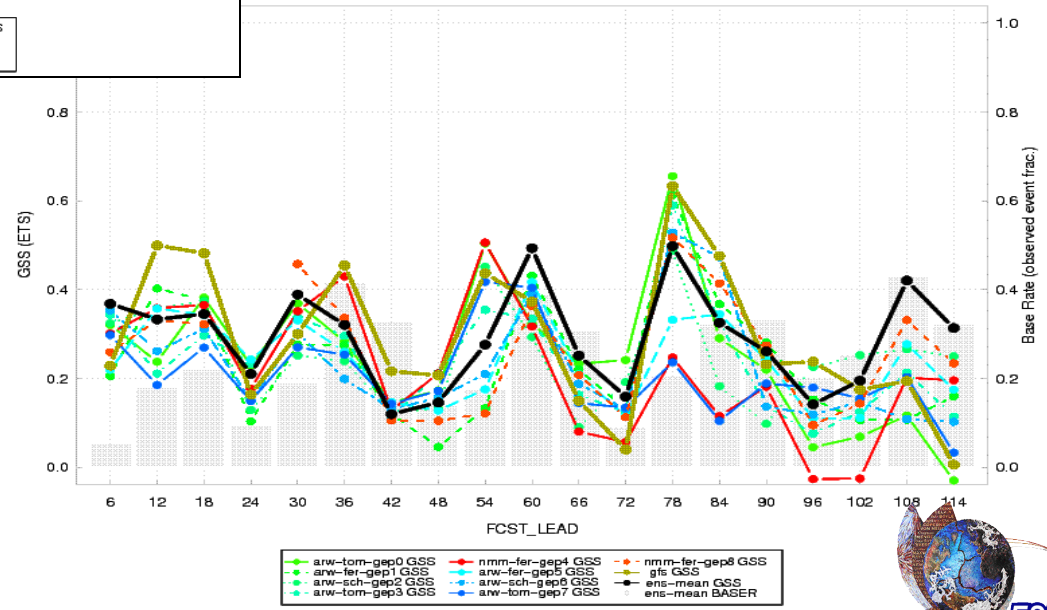




## 30-day summary scoring for January, ETS

GFS degradation at higher  
thresholds

RUN PERFORMANCE for APCP\_06  $\geq 0.100''$  GSS  
STANT INIT TIME 2010011712 - Region: FULL Obs: Stage IV

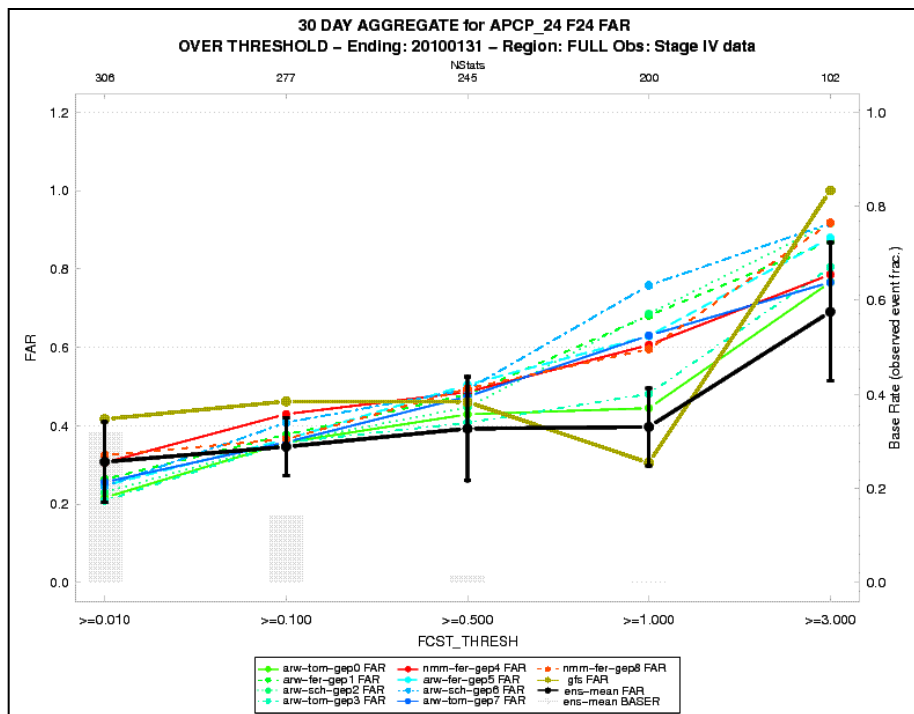


Lead Times for single  
initiation time

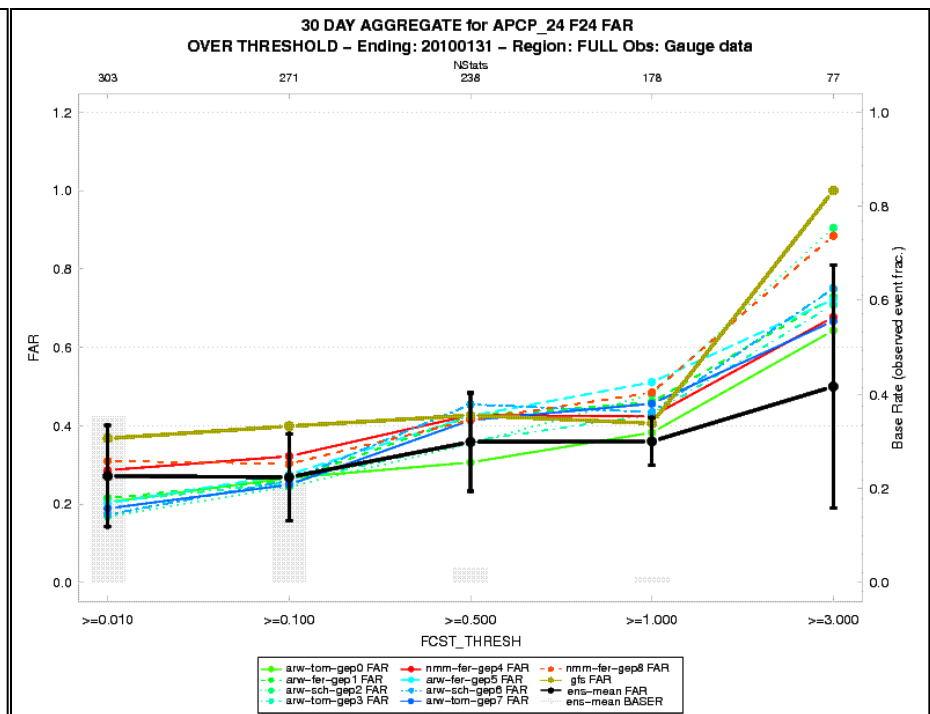
All forecasts initiated at  
1200 UTC

# False Alarm Rates for Different QPF Thresholds Aggregated for January: Verification Dataset Comparison

## Stage IV analyses



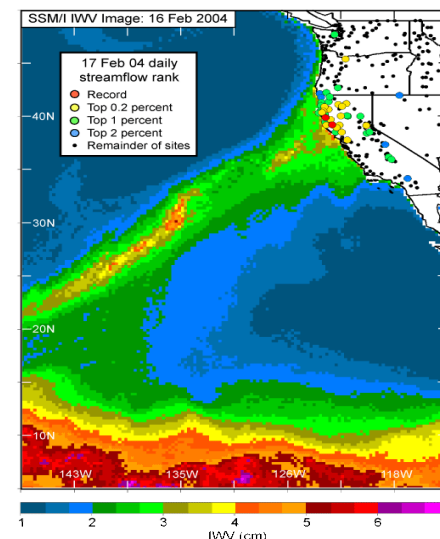
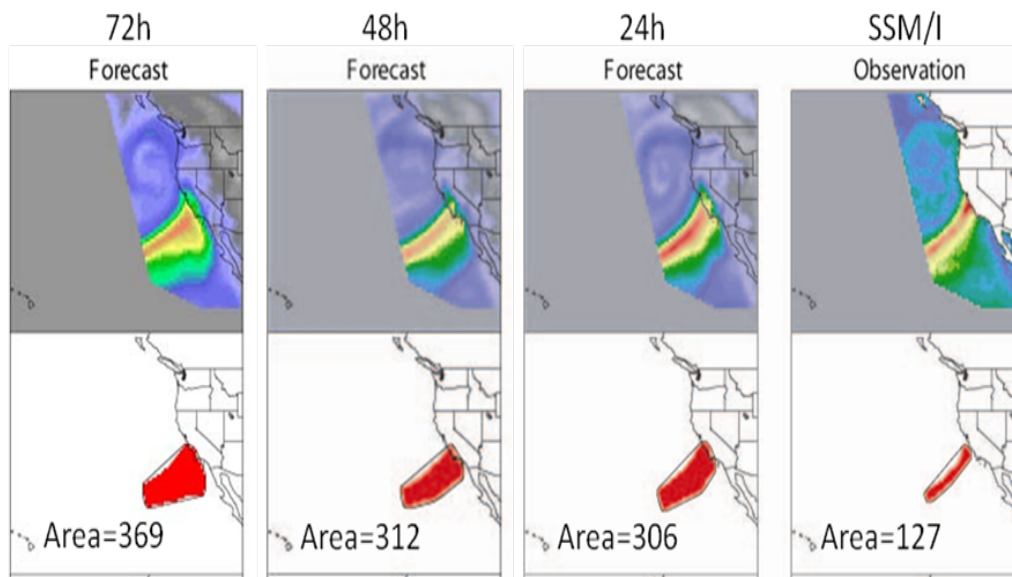
## 24h gage observations



# Atmospheric River Analyses: Object-Based Spatial Verification

- 1) Retrospective Study of 6 historical ARs
- 2) GFS model data and satellite IWW observations
- 3) Test application of MET/MODE object-based verification to forecasts of ARs

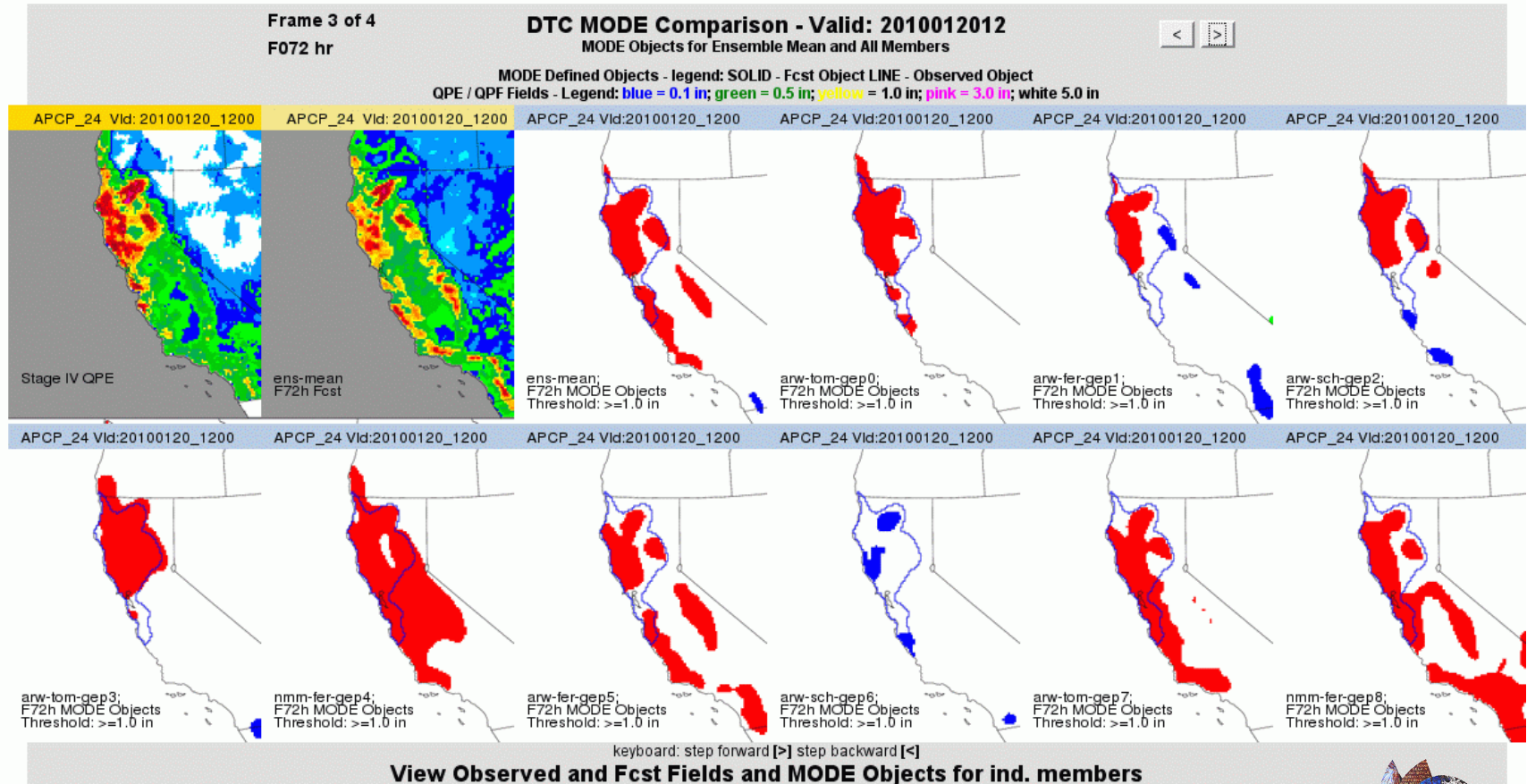
MODE Object Comparison of  
GFS Forecasts with SSM/I Observation  
for 25 February, 2004



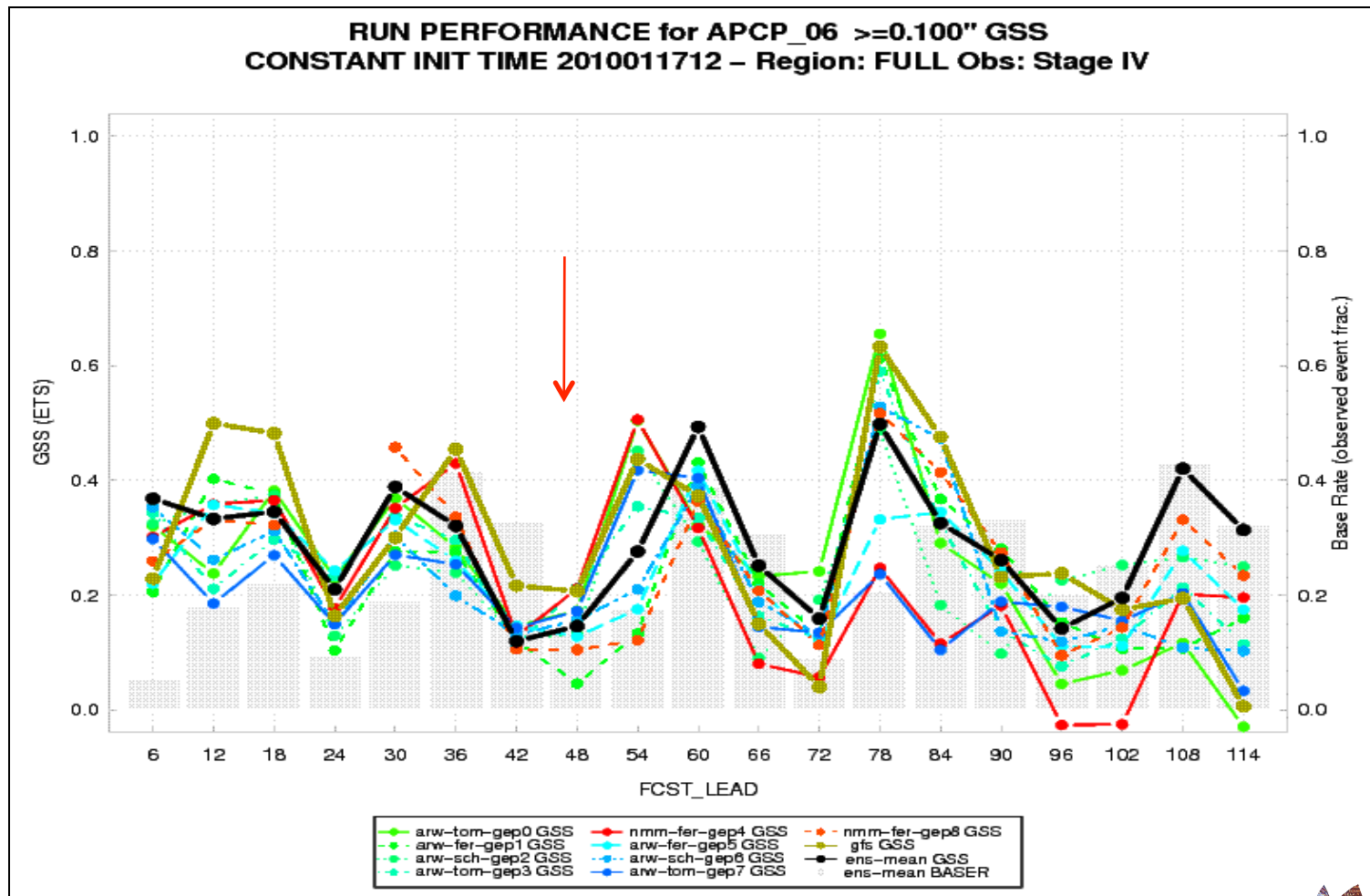
Ralph et al., 2006



## MODE/MET objects: Spatial Verification for ensemble QPF fields

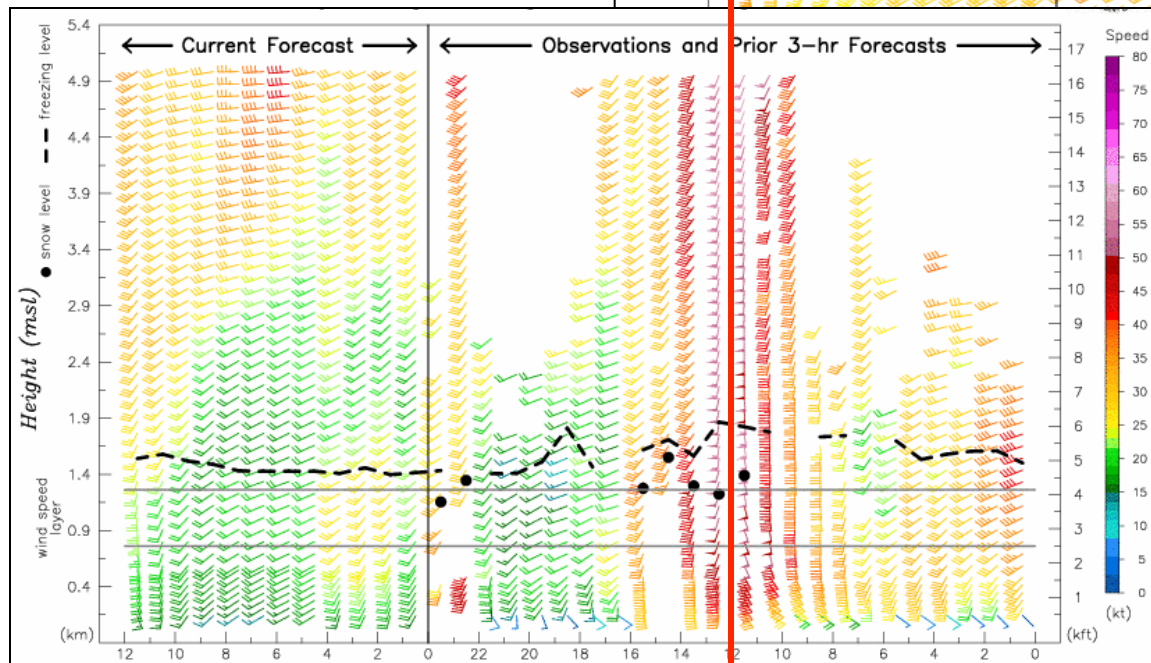


# Forecasts initiated at 1200 UTC 17 January 2010

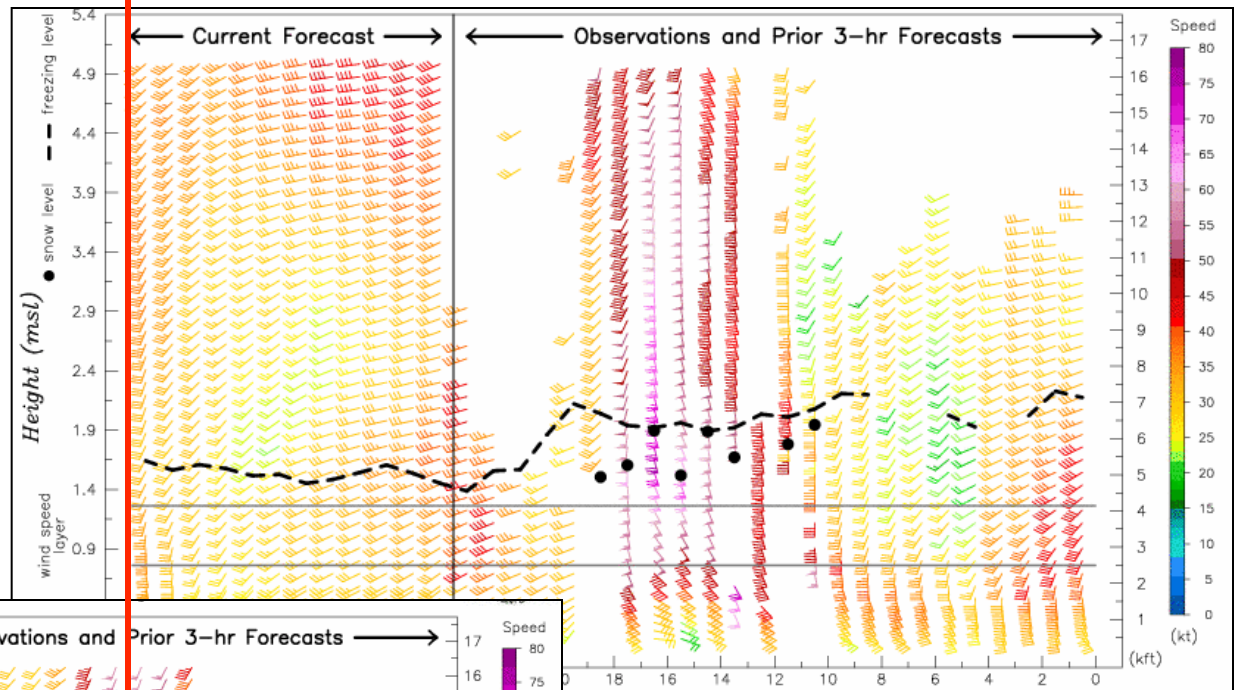


# Profiler Winds at Bodega Bay

Diurnal cycling of winds, from southerly to westerly (upslope); how well to models perform?

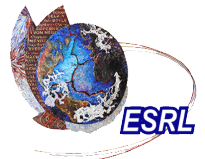


January 19

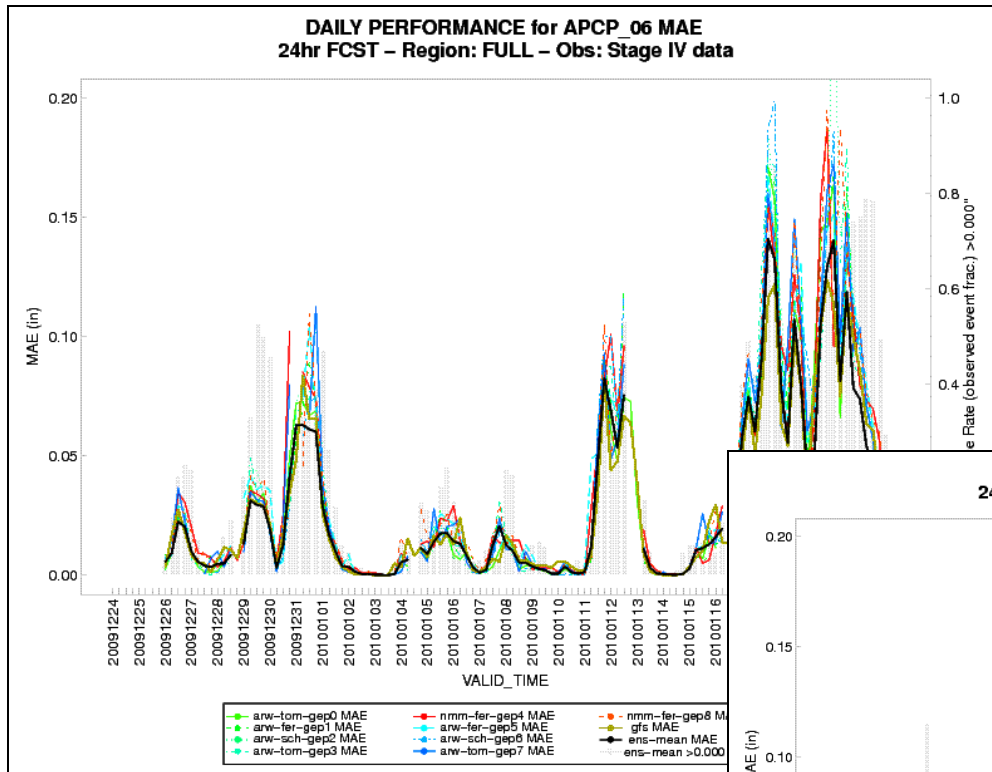


January 18

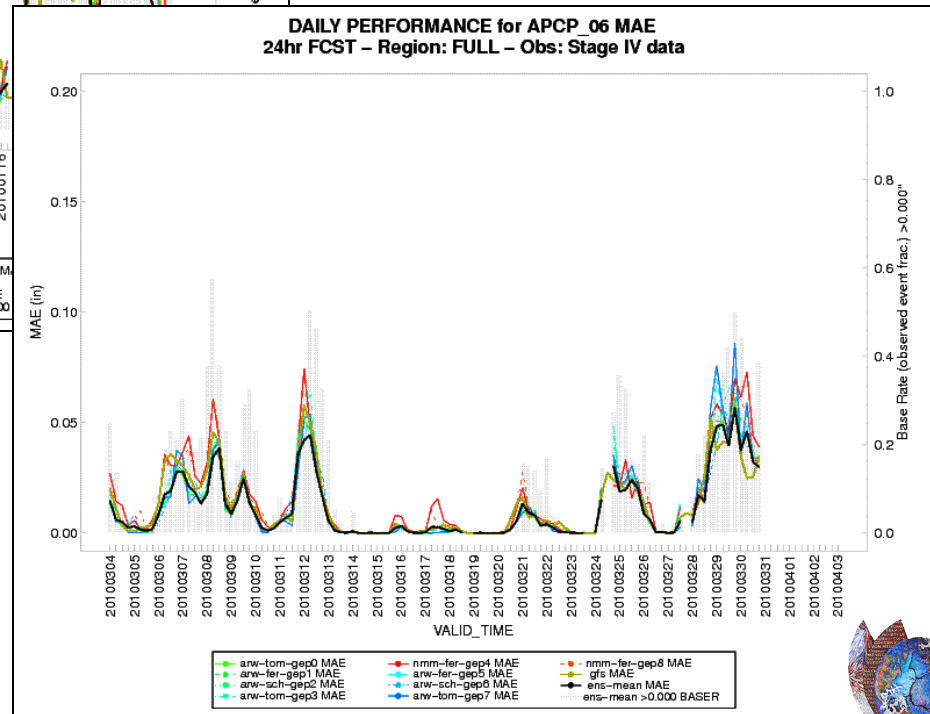
Full explanation and diagnosis could use wind field verification as well as QPF verification



# Sensitivity to IC's: Preliminary Comparison



December-January,  
no 'Hot-start'



'Hot-start', March

# HMT-West 2010-11: New Online Verification Website Utilities

- HMT-West winter exercise verification demonstration improvements
  - Add 1-2 baseline model comparisons (NAM, SREF...)
  - Add time series of MODE attributes
  - Add reliability and roc diagram plotting to real-time display
  - Include 6h gage verification, including QC
  - Add METViewer display options
    - Episodic Aggregation
    - Customizable Plotting
    - On-line demonstration (this P.M.? See Tara or myself)



# Long-Range DTC/HMT Collaboration: Science and R2O Objectives

Address Key Forecast Assessment Questions:

- Assess capabilities/limitations of high-resolution ensemble forecast systems for extreme precipitation and AR forecasting
- HMT exercise verification demonstration
  - Collaborate with DET to apply MET-based probabilistic verification techniques and develop effective displays
  - Add additional spatial verification techniques for ensembles
- QPE evaluation and sensitivity testing
- Further evaluation of MODE and other spatial verification methods to assess AR forecasts: merging GFS and WRF ensemble analyses

## Summary, Conclusions, Issues, Suggestions

- General Assessment: WRF ensemble mean at higher resolution than GFS performs better with most scoring metrics (not statistically scrutinized yet.....)
- Verification system ready for further focused scientific queries vis-à-vis model; what will they be?
- R2O: Web-based results to ALPS to make more readily available
- We're looking for suggestions, etc.!!!

